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EP 0825514 A2   WO 99/22338 A1
WPI Abstract Accession No. 1999-292594 &
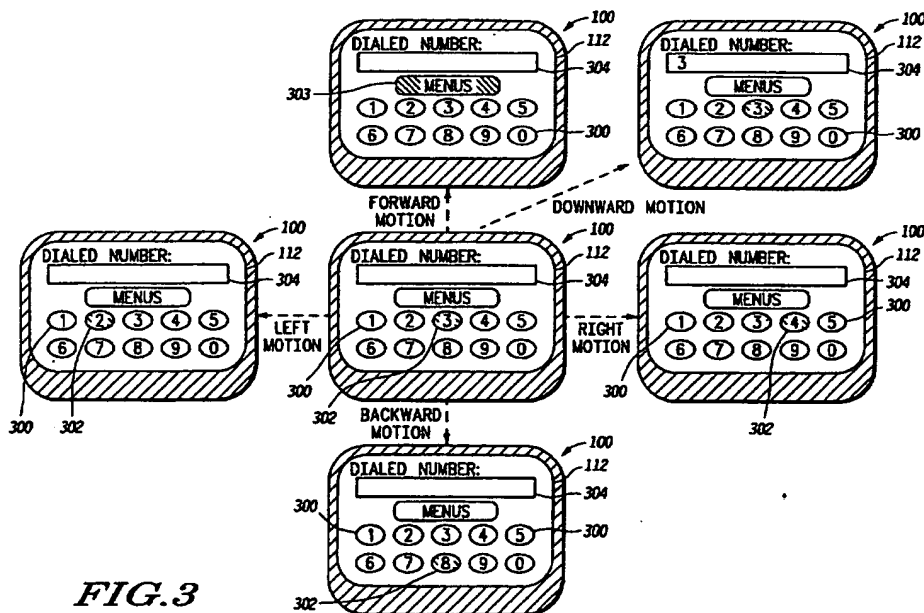JP 011095910

(58) Field of Search
UK CL (Edition S) H4L LEUG , H4T TBLA TBLC TBLX
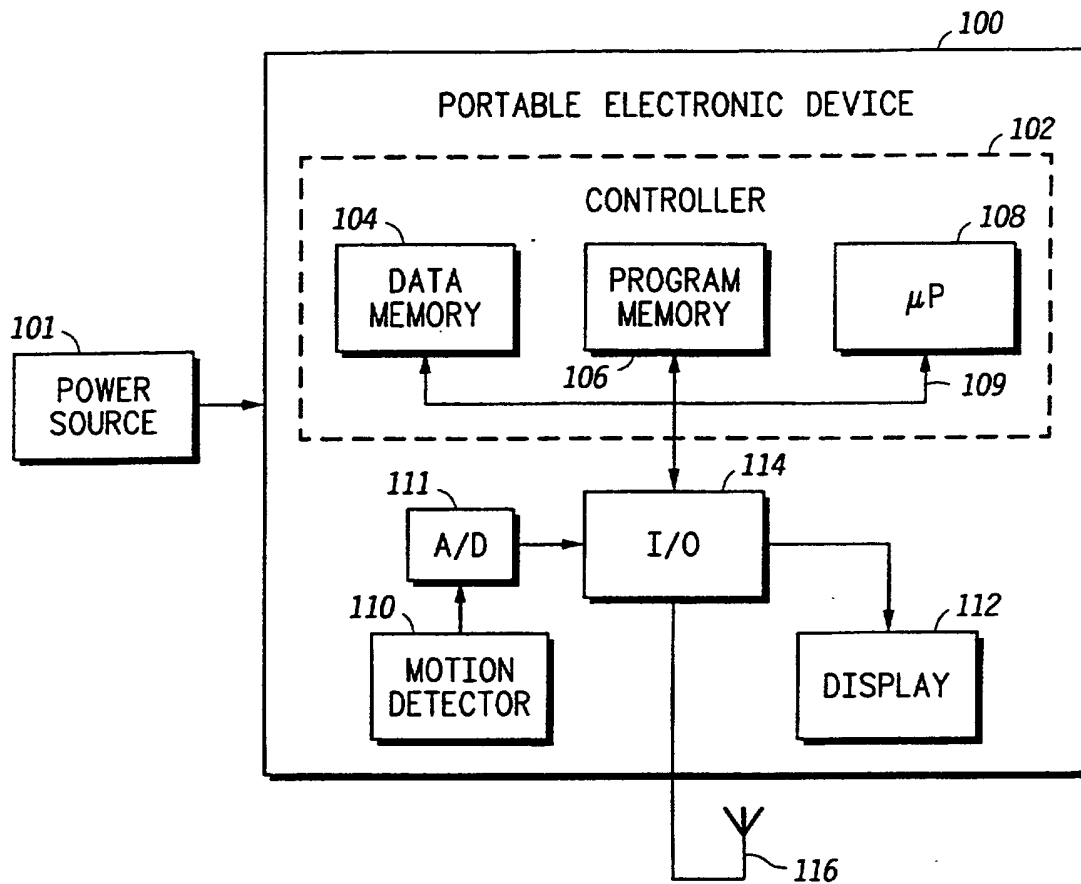Online: WPI, EPODOC, JAPIO

(54) Abstract Title
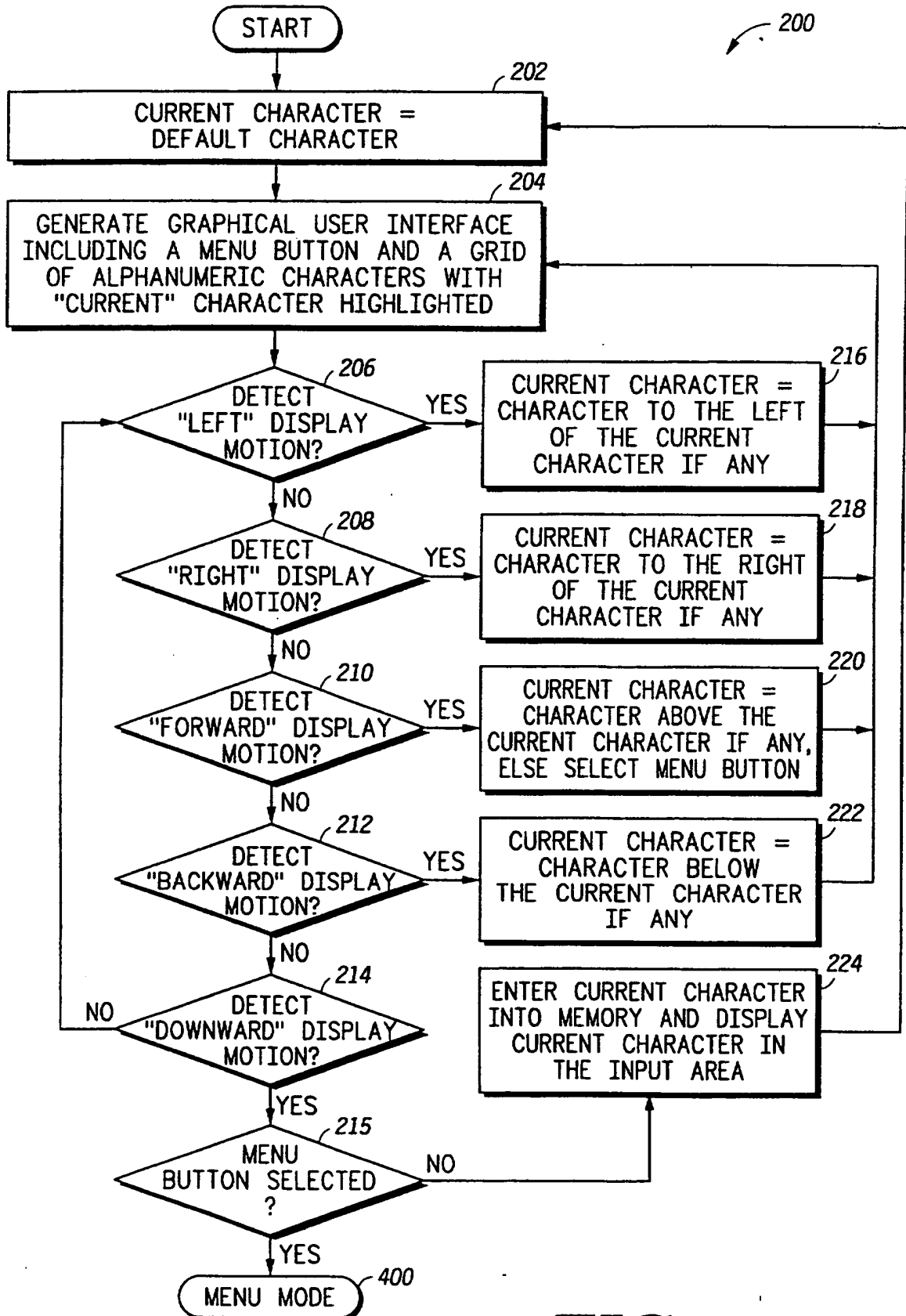Selecting alphanumeric characters or menu options by movement of the display device

(57) A portable electronic device (100) facilitates entry of user data and commands by detecting motion of the device (100). A display (112) is used to depict a plurality of user interface options (300, 500, 502). The user physically moves the device (100) to highlight and enter a desired character of data (302) or a command (504). For example, a virtual keypad (300) may be displayed, and when the device (100) is moved forward, backward, left, or right relative to the plane of the display (112) the next letter or number in that direction (or the opposite direction) may be highlighted. Then, by moving the device (100) downward (i.e., perpendicular to the plane of the display (112)) the highlighted letter or number may be entered as if it were typed on a real, dedicated keypad.

FIG.3

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FIG.1

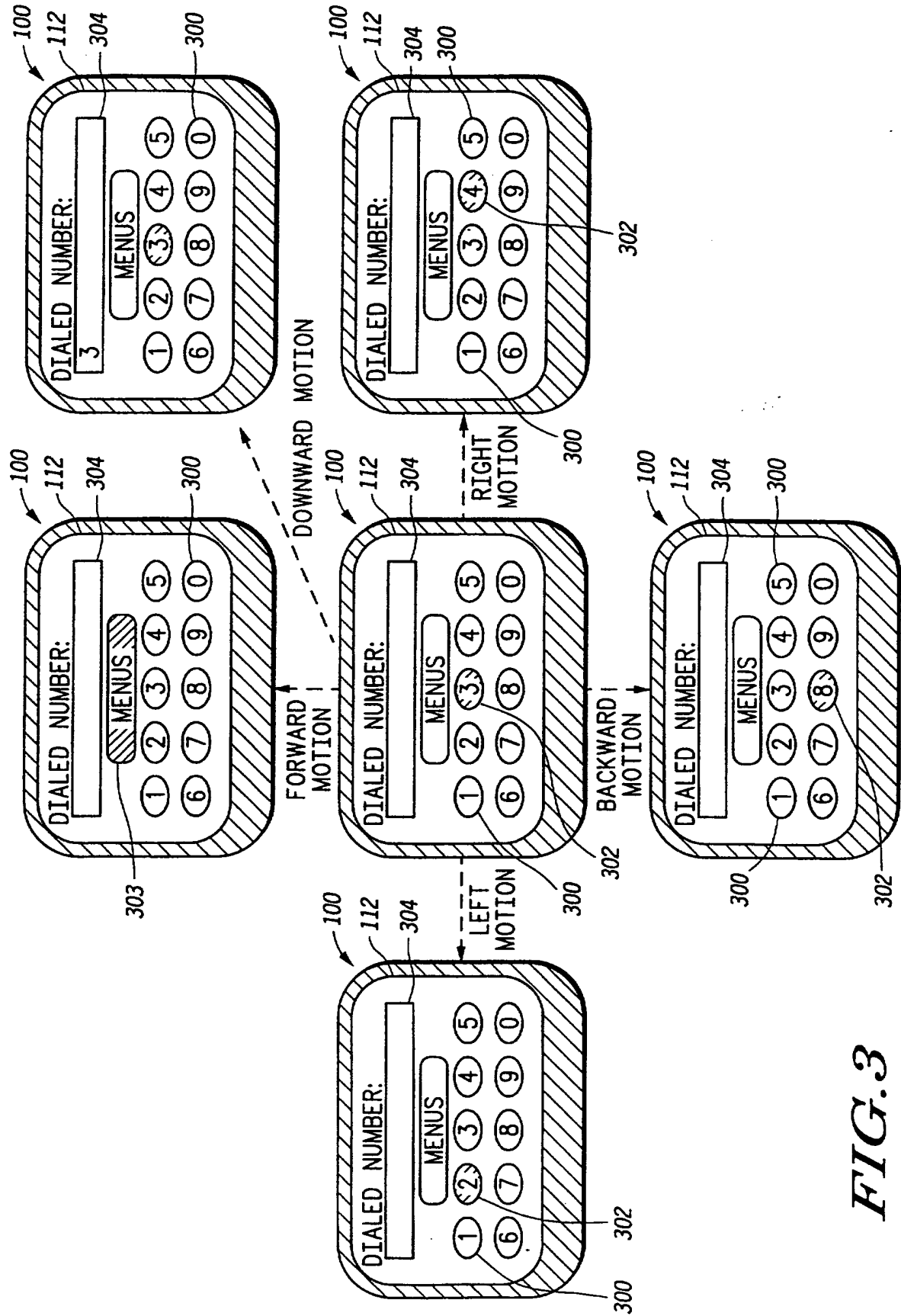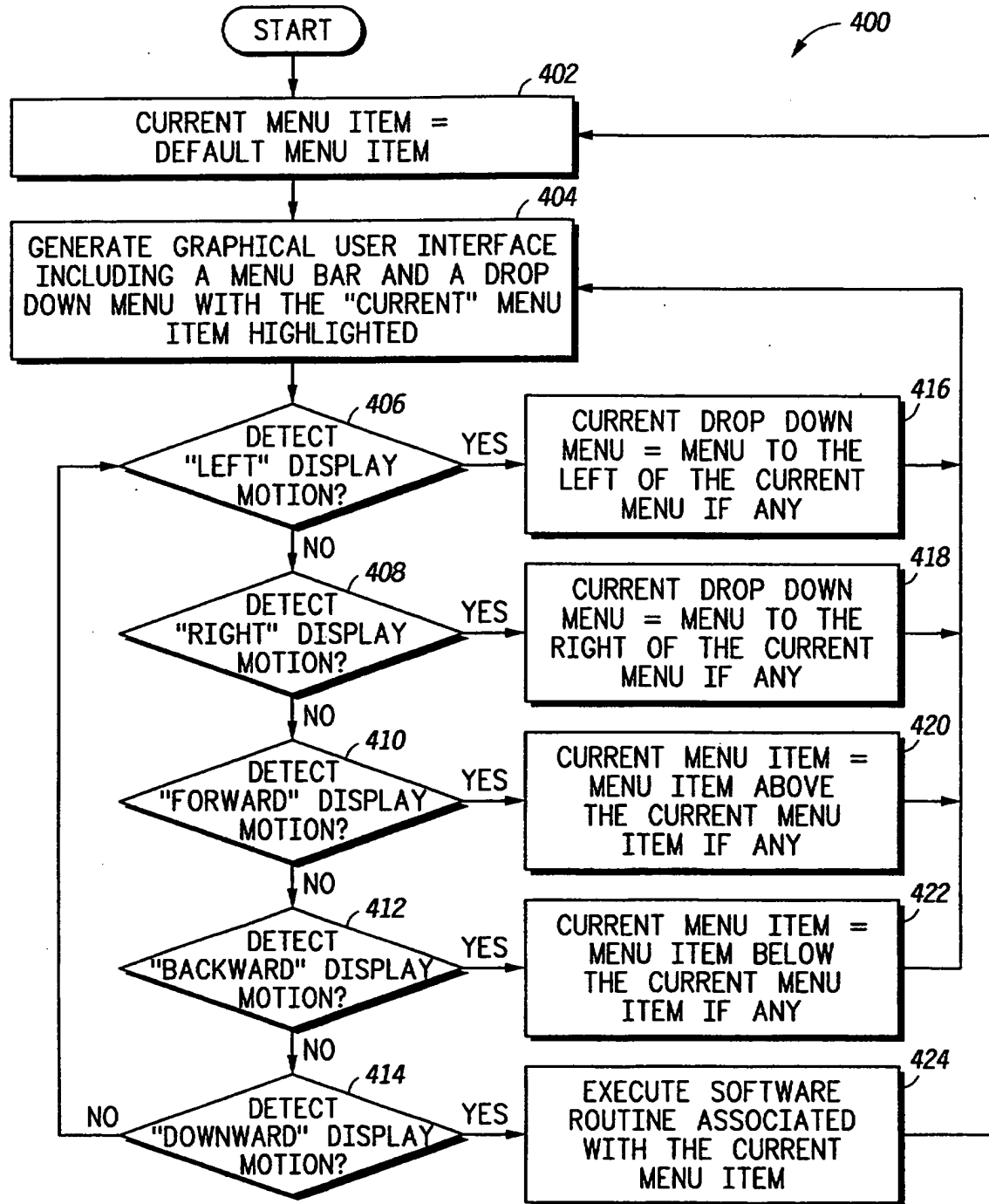FIG.2

FIG.3

START

400

402
CURRENT MENU ITEM =
DEFAULT MENU ITEM

404
GENERATE GRAPHICAL USER INTERFACE
INCLUDING A MENU BAR AND A DROP
DOWN MENU WITH THE "CURRENT" MENU
ITEM HIGHLIGHTED

406
DETECT
"LEFT" DISPLAY
MOTION?

YES → **416**
CURRENT DROP DOWN
MENU = MENU TO THE
LEFT OF THE CURRENT
MENU IF ANY

NO

408
DETECT
"RIGHT" DISPLAY
MOTION?

YES → **418**
CURRENT DROP DOWN
MENU = MENU TO THE
RIGHT OF THE CURRENT
MENU IF ANY

NO

410
DETECT
"FORWARD" DISPLAY
MOTION?

YES → **420**
CURRENT MENU ITEM =
MENU ITEM ABOVE
THE CURRENT MENU
ITEM IF ANY

NO

412
DETECT
"BACKWARD" DISPLAY
MOTION?

YES → **422**
CURRENT MENU ITEM =
MENU ITEM BELOW
THE CURRENT MENU
ITEM IF ANY

NO

414
NO ← DETECT
"DOWNWARD" DISPLAY
MOTION?

YES → **424**
EXECUTE SOFTWARE
ROUTINE ASSOCIATED
WITH THE CURRENT
MENU ITEM

FIG.4

FIG.5

600

START

602
MOTION
OF DISPLAY
DETECTED?

NO

YES

604
EXECUTE CORRELATION
ROUTINE

606
CORRELATION
TO PREDEFINED
MOTION?

YES

NO

608
ADD CURRENT MOTION TO
CURRENT SERIES OF
MOTIONS IN MEMORY

610
CLEAR PREVIOUS MOTIONS
FROM MEMORY

612
EXECUTE DISPLAY GENERATION
ROUTINE ASSOCIATED WITH
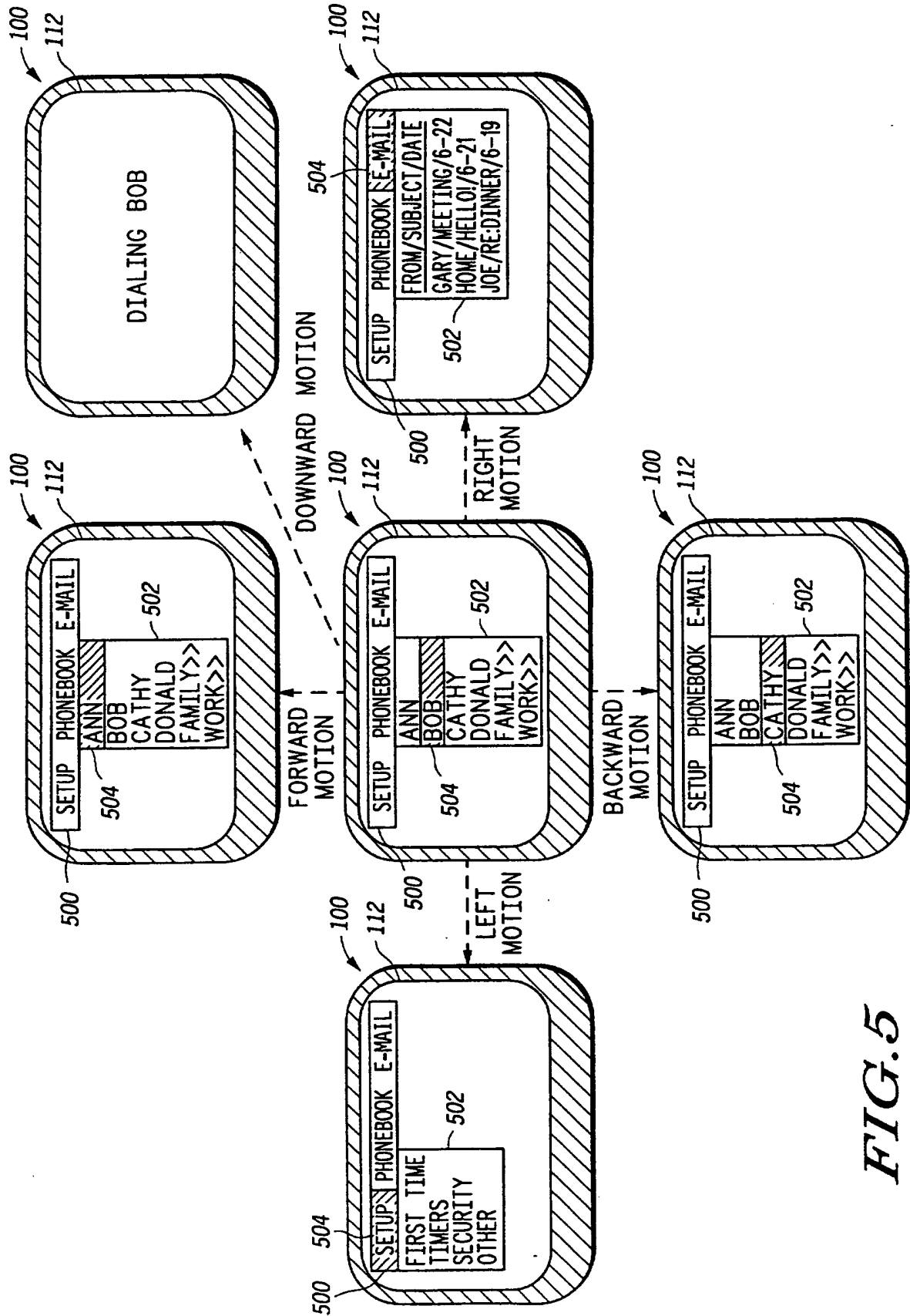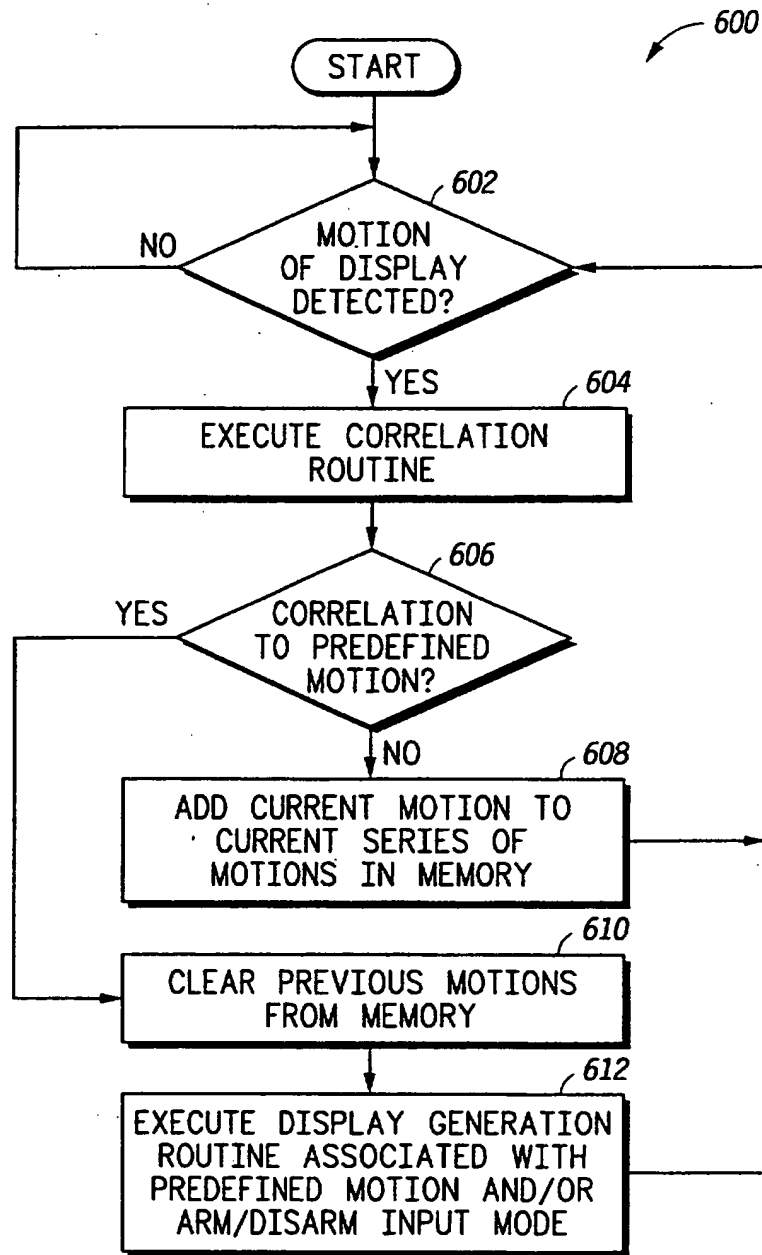PREDEFINED MOTION AND/OR
ARM/DISARM INPUT MODE

FIG.6

APPARATUS AND METHODS FOR SELECTING A USER INTERFACE OPTION ON A PORTABLE ELECTRONIC DEVICE

Field of the Invention

5   The present invention relates in general to a method and apparatus for

selecting a user interface on a portable electronic device and in particular to

entering data and/or selecting menu options via a graphical user interface,

associated with a portable electronic device, by detecting motion of the device

which is contemporaneous with a predetermined graphical display.

10

Background of the Invention

Advances in integrated circuit technology have allowed portable

electronic devices, such as cellular telephones, to substantially decrease in

size. These reduced size devices are often preferred by users because they

15   are lighter and provide greater portability. However, certain components of a

typical portable electronic device can not be reduced much further in size

without significantly impairing the device's usability. One such component is

the keypad. The typical cellular telephone keypad includes dialing digits 0 –

9, as well as a few other function keys such as "clear", "send", "end", etc. The

20   keypad adds cost, mechanical design complexity, size, and weight to the

cellular telephone. The minimum size of the keys is dictated by the size of

the human finger. In other words, if the keys are too small, many users will

find it difficult to dial the telephone.

Proposed solutions include use of such technologies as voice recognition and touch screens to eliminate the keypad, however these technologies have significant limitations and drawbacks. Voice recognition solutions may require extensive training and often fail to perform properly,

5   thereby requiring the user to repeat certain commands. This repetition can be time consuming and frustrating for the user. Further, voice recognition algorithms require significant computational resources, thereby adding cost to the electronic device and/or delaying the responsiveness of the recognition process. Still further, voice recognition solutions lack privacy. For example, if

10   the user is dialing a phone number in a public area, the phone number and/or name of the person called can be heard by people nearby. Touch screen technology solves the problems of privacy, accuracy, and computational resources. However, touch screens are expensive and often reduce the visual clarity of the underlying display. Touch screens are also similarly size

15   limited if it is intended for the user to use a finger to make a selection, or the touch screen requires the use of a stylus which may become lost.

Brief Description of the Drawings

These and other features and advantages of the present invention will be apparent to those of ordinary skill in the art in view of the detailed description of the preferred embodiment which is made with reference to the drawings, a brief description of which is provided below.

FIG. 1 is a block diagram illustrating a portable electronic device.

FIG. 2 is a flowchart of a program that can be implemented by the portable electronic device of FIG. 1 to select alphanumeric characters via a user interface.

FIG. 3 is a line drawing of an exemplary user interface that can be implemented by the portable electronic device of FIG. 1 to display alphanumeric options.

FIG. 4 is a flowchart of a program that can be implemented by the portable electronic device of FIG. 1 to select menu items via a user interface.

FIG. 5 is a line drawing of an exemplary user interface that can be implemented by the portable electronic device of FIG. 1 to display menu options.

FIG. 6 is a flowchart of a program that can be implemented by the portable electronic device of FIG. 1 to execute a software routine in response to the detection of predefined display motions.

Detailed Description of the Preferred Embodiments

A portable electronic device depicts a plurality of user interface options on its display and allows a user to select one or more of the options by physically moving the device in a particular direction. For example, a virtual keypad may be displayed, and when the device is moved forward, backward, left, or right relative to the plane of the display, the next letter in that direction (or the opposite direction) may be highlighted. Then, by moving the device downward (i.e., perpendicular to the plane of the display) the highlighted letter may be entered as if it were typed on a real, dedicated keypad.

A portable electronic device 100 is shown in FIG. 1. In the preferred embodiment, the portable electronic device 100 is a wireless communication device such as a handheld cellular telephone or pager. However, the portable electronic device 100 may be a general purpose computing device, such as a personal digital assistant, or an application specific device, such as an electronic book or an electronic map. The portable electronic device is coupled to a power source 101. Preferably, the power source is a battery. However, persons of ordinary skill in the art will readily appreciate that other power sources, such as, for example, an AC transformer's output converted to DC or a solar panel, may be used as the power source 101.

A controller 102 in the portable electronic device 100 may include a data memory 104, such as a random-access memory, a program memory 106, which may be in the form of a read-only memory (ROM), and a microprocessor 108, all of which may be interconnected by an address/data

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bus 109. In one embodiment, the program memory 106 electronically stores a computer program that implements all or part of the method described below with respect to FIGS. 2, 4, and 6. Preferably, the program is executed by the microprocessor 108. The program memory 106 may be loaded from a fixed memory device such as a hard drive, or the program memory 106 may be preloaded with firmware as is well known to persons of ordinary skill in the art. Some of the steps described in the method below may be performed manually or without the use of the portable electronic device 100.

Preferably, a motion detector 110 via an A/D converter 111 and a display 112 are electronically coupled to the controller 102 via a conventional input/output (I/O) circuit 114. The motion detector 110 is also mechanically coupled to the display 112 such that the motion of the motion detector 110 corresponds to the motion of the display 112.

The motion detector 110 is preferably made up of two accelerometers, each of which detect changes in motion (e.g., accelerations). A first accelerometer is positioned parallel to the plane of the display 112 to detect motion of the device 100 parallel to the plane of the display 112 (i.e., along the x-axis and y-axis). The first accelerometer outputs two voltages, one for the x-axis and one for the y-axis, centered approximately around a static DC voltage point. As the device 100 is accelerated (or moved) in a positive or negative direction along the x-axis, the y-axis or a combination thereof, the output voltages increase or decrease from the static DC voltage point. For example, if movement of the device 100 causes the x-axis output voltage to

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increase from the static DC voltage point, there is movement in an X direction and the acceleration in the X direction is positive (+). If movement of the device 100 causes the x-axis output voltage to decrease from the static DC voltage point, there is movement in the X direction and the acceleration in the X direction is negative (-). If there is no movement of the device 100 in the X direction, the x-axis output voltage does not vary and there is no acceleration in the X direction. The same holds true for the y-axis output voltage. A second accelerometer is positioned perpendicular to the plane of the display 112 to detect motion of the device 100 perpendicular to the plane of the display 112 (i.e., along the z-axis). The second accelerometer operates in a manner similar to that of the first accelerometer except only one output voltage is used to track movement of the device in a Z direction. The accelerometers may be Analog Devices 2-axis MEMS (micromachine) based accelerometers, part number ADLX202, commonly available from many sources, or other suitable commercially available accelerometer.

The controller 102 receives motion detection signals from the motion detector 110. In response to certain motion detection signals, the controller 102 causes the display 112 to show various predefined graphical depictions. By moving the electronic device 100 in a particular direction contemporaneous with a particular display being shown, a user of the portable electronic device 100 may enter data and commands into the controller 102.

The I/O circuit 114 may also include a transmitter and receiver (not depicted) for electronically coupling the controller 102 to an antenna 116. The antenna 116 may be used to transmit and/or receive information associated with user interface options and other information used in the

5   process described below.

In the illustrated embodiment of FIG. 1, the device 100 lacks a dedicated keypad, such as a cellular telephone keypad having alphanumeric keys 0-9 and function keys "send", "end", "clear", etc, and, thereby, avoids the added cost, mechanical design complexity, size, and weight associated with

10   such dedicated keypad.

A flowchart of a program 200 that can be implemented by the portable electronic device 100 to select alphanumeric characters is illustrated in FIG. 2. Preferably, the programmed steps are executed by the controller 102. Generally, the program 200 generates a series of graphical depictions

15   indicative of selected (but not yet entered) alphanumeric characters in response to the motion of the display 112. The program 200 also allows a selected character to be entered in response to a motion of the display 112. Alphanumeric characters include English letters, numbers, Roman numerals, Chinese characters, Kanji, Kana and/or any other human recognizable

20   language symbol.

When the program 200 is initiated, the controller 102 initializes a "current character" variable to a default value at step 202. For example, a character located near the center of a virtual keypad may be selected as the

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default character in order to minimize the average "distance" to the desired

character. Alternatively, the default character may be the last character

entered. Subsequently, at step 204, the controller 102 generates a graphical

user interface on the display 112 showing a plurality of characters 300 (e.g., a

5   virtual keypad) with the current character 302 visually identified (e.g.,

highlighted, see FIG. 3).

The program 200 then enters a motion detection loop (steps 206 –

214). In this example, the motion detection loop looks for motion (e.g.,

acceleration) along the plane of the display 112 in a direction consisting

10   essentially of a vector to the left (step 206), to the right (step 208), forward

(step 210), backward (step 212), and motion perpendicular to the plane of the

display 112 in a direction consisting essentially of a downward vector (step

214). For purposes of clarity and discussion, the plane of the display 112

extends co-planarly with a plane defined by the FIG. 3 drawing sheet on

15   which the display 112 of the device 100 is depicted. Motion from a static

situation or a change in velocity implies acceleration. Motions are preferably

generated by the user holding the device 100 in his hand and then moving his

hand, or motions may be generated by the user by tapping a side of the

device 100. Typically, there is always some motion occurring. Certain

20   motions are below the threshold of ordinary detection, and, therefore, can not

be considered by the program 200. Other motions, such as involuntary hand

vibrations and/or slight hand movements may be detected, but are preferably

ignored to avoid changing the display without deliberate hand movement by

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the user. On the other end of the spectrum, excessive accelerations may be ignored. For example, dropping the portable electronic device 100 on a hard surface typically creates an acceleration that is preferably considered too large to come from a deliberate hand movement.

Although this embodiment looks for motion in only five directions, persons of ordinary skill in the art will readily appreciate that detection of motion in many other directions is possible. For example, a motion including both a significant forward vector and a significant right vector (i.e., diagonal motion) may be detected. Once detected, diagonal motion may produce a change to the display 112 (e.g., diagonal movement of a cursor) or, depending on the current depiction on the display, the diagonal motion may be ignored.

Once a motion with a magnitude greater than a minimum threshold and less than a maximum threshold is detected in one of the predefined directions, a corresponding step (steps 216 - 224, 400) is taken to enter a new mode of operation, produce a new depiction on the display 112 and/or enter the current character 302. In this embodiment, if motion is detected to the left (step 206), the current character 302 (or button, or icon, etc.) is moved to the left if possible (step 216). If there are no characters depicted to the left of the current character 302, no change is made to the current character 302. Similarly, if motion is detected to the right (step 208), the current character 302 is moved to the right if possible (step 218). If forward motion is detected (step 210), the current character 302 is moved up if possible (step 220). Or,

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in this embodiment, a menu's button 303 may be selected. If backward motion is detected (step 212), the current character 302 is moved down if possible (step 222). Once the current character 302 is updated, the program 200 regenerates the depiction of the graphical user interface on the display 112 to show the new current character 302 highlighted (step 204). In an alternate embodiment, the direction of the current character 302 is moved opposite to the detected direction of the display 112. In this manner, the user is presented with the appearance of the cursor position remaining stationary while the device 100 moves.

The number of character positions that the current character 302 moves may vary. In one embodiment the current character 302 is shifted one position for each valid motion detected regardless of the magnitude of the motion. In another embodiment, the number of positions the current character 302 moves may be proportionate to the magnitude of the detected motion. For example, the range of motions between the minimum threshold and the maximum threshold may be divided into three ranges (e.g., low, medium and high). A detected motion may then be categorized by comparing the magnitude of the motion with the thresholds of the predetermined ranges. If a motion in the low range is detected, the current character 302 may move one position (e.g., from "1" to "2"). If a motion in the medium range is detected, the current character 302 may move two positions (e.g., from "1" to "3"). If a motion in the high range is detected, the current character 302 may move three positions (e.g., from "1" to "4"). Persons of ordinary skill in the art

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will readily appreciate that many other associations between detected motion and cursor movement are possible.

Preferably, when the user has the character highlighted that he wishes to enter, he produces a downward motion that is perpendicular to the plane of the display 112. Such downward movement is preferred because it is a movement that a user associates with pressing a conventional key or button and, thus, will be partially intuitive to the user. The program 200 detects the downward motion (step 214) and determines if a character 302 or the menu button 303 is currently highlighted (step 215). If a character 302 is currently highlighted, the program 200 preferably enters the current character 302 (step 224). If the menu button 303 is highlighted, the program 200 preferably enters a menu mode at step 400 (see FIGS. 4 and 5). Of course, buttons other than a menu button may be used. Entering an alphanumeric character preferably includes storing the character in memory 104 and displaying the character in an alphanumeric character input area 304 on the display 112 of the portable electronic device 100. In some embodiments, entering a numeric character also includes dialing the entered digit into a telephone system. Once a character is entered, the program 200 preferably repeats (step 202).

In an alternate preferred embodiment, the user uses a predefined gesture motion (e.g., double tap the portable electronic device 100) to "enter" the current character or select a virtual button. This embodiment has the advantage of requiring one less accelerometer if the predefined gesture does

not use z-axis acceleration. Avoiding use of z-axis acceleration reduces cost, complexity and thickness of the portable electronic device 100.

A flowchart of a program 400 that can be implemented by the portable electronic device 100 to select menu items 504 is illustrated in FIG. 4. Preferably, the programmed steps are executed by the controller 102. Generally, the program 400 generates a series of graphical depictions indicative of selected (but not yet entered) menu items 504 in response to the motion of the display 112. The program 400 also allows a selected menu item 504 to be entered in response to a motion of the display 112. Menu items include text, icons, and/or any other type of graphical symbol or string of symbols. Preferably, selection of a menu item executes a software routine associated with that menu item. For example, a menu item may cause the device 100 to enter or exit the alpha-entry mode described above.

When the program 400 is initiated, the controller 102 initializes a "current menu item" variable to a default value at step 402. For example, the title of the first drop-down menu 502 in a menu bar 500 may be selected (see FIG. 5). Subsequently, at step 404, the controller 102 generates a graphical user interface on the display 112 showing the menu bar 500 with the drop down menu 502 and a selected menu item 504. The program 400 then enters a motion detection loop (steps 406 – 414). In this example, the motion detection loop looks for motion along the plane of the display 112 in a direction consisting essentially of a vector to the left (step 406), to the right

(step 408), forward (step 410), backward (step 412), and motion perpendicular to the plane of the display 112 (step 414).

As described above, the magnitude and/or duration of certain motions may be above or below a predefined threshold. Preferably these motions are ignored to avoid changing the depiction on the display 112 without a deliberate hand movement by the user. Again, this embodiment looks for motion in only five directions. However, persons of ordinary skill in the art will readily appreciate that detection of motion in many other directions is possible.

Once a motion greater than a minimum threshold and less than a maximum threshold is detected in one of the predefined directions, a corresponding step (steps 416 - 424) is taken to produce a new depiction on the display 112 and/or execute a software routine associated with the current menu selection 504. In this embodiment, if motion is detected to the left (step 406), the previous menu 502 is shown if possible (step 416). If there is no menu to the left of the current menu, no change is made. Similarly, if motion is detected to the right (step 408), the next menu 502 is shown if possible (step 418). If forward motion is detected (step 410), the current menu item 504 is moved up if possible (step 420). If backward motion is detected (step 412), the current menu item 504 is moved down if possible (step 422). Once the current menu item 504 is updated, the program 400 regenerates the graphical user interface on the display 112 to show the new menu item 504 highlighted (step 404). In an alternate embodiment, the direction the current

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menu item 504 is moved is opposite to the detected direction of the display 112. The number of positions moved in the menu 502 may vary. In one embodiment the number of positions is shifted once for each motion regardless of the magnitude of the motion. In another embodiment, the number of positions moved may be proportionate to the magnitude of the detected motion as described in detail above.

Preferably, when the user has the desired menu item 504 highlighted, he produces a downward motion that is perpendicular to the plane of the display 112. The program 400 detects the downward motion (step 414) and executes a software routine associated with the current menu item 504 (step 424). Preferably, the program 400 then repeats (step 402). In an alternate embodiment, the user may use a predefined gesture instead of the downward motion to conserve an accelerometer as described above.

A flowchart of a program that can be implemented by the portable electronic device of FIG. 1 to execute a software routine in response to the detection of predefined display motions (i.e., gestures) is shown in FIG. 6. Preferably, the programmed steps are executed by the controller 102.

When the program 600 is initiated, the controller 102 waits for a signal from the motion detector 110 that a motion associated with the display 112 has been detected (step 602). When a motion is detected, the controller 102 executes a correlation software routine (step 604). The correlation software routine compares the detected motion, and optionally a series of previously detected motions stored in data memory 104, to one or more motion patterns

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stored in program memory 106 (e.g., a predefined gesture such as shaking right and left for "no" or shaking forward and backward for "yes"). The controller 102 then determines if the correlation software found a match with a predefined motion (step 606). If no match is found, the controller 102 adds the current motion to a series of motions stored in data memory 104 for use in subsequent correlation steps (step 608). If a match is found at step 606, the controller 102 may clear the series of motions stored in data memory 104 so they are not reused (step 610).

Subsequently, the controller 102 executes a display generation routine associated with the matched predefined motion and/or toggles (i.e., arms or disarms) an input mode (step 612). Preferably, the new display generated depends on the current display as well as the predefined motion. For example, if the current display asks the user if he would like to dial the displayed number, and the motion is determined to be a yes like forward and backward motion, then the new display may be an indication that the number is being dialed. By arming and disarming the input mode, the user may avoid undesired motions from being translated to user inputs. For example, a predefined gesture motion such as a double tap (i.e., two taps within a predefined time period) on a display 112 may cause the device 100 to enter an alpha-entry mode.

A method and apparatus for entering user data and commands into a portable electronic device by detecting motion of the device has been provided. Although the foregoing description focuses on display depictions

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with discrete cursor positions such as keys on a virtual keyboard and/or menu items, persons of ordinary skill in the art will readily appreciate that the resolution of cursor movement may be as small as the smallest changeable display element. For example, a user may use the aforementioned to move an arrow freely over a depiction of a map or move a "windowed display" over a larger virtual display. For example, the user may view a map, larger than the physical display 112, by scrolling in the direction of a detected motion or by scrolling in the opposite direction of the detected motion. Systems implementing the selection methods described herein can enjoy a rich graphical user interface without the added cost, complexity, size, and weight of a typical user input device.

The foregoing description has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Many modifications and variations are possible in light of the above teachings. It is intended that the scope of the invention be limited not by this detailed description, but rather by the claims appended hereto.

What is claimed is:

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Claims

1.   A method for selecting a user interface option of entering alphanumeric

data in a user interface of a portable electronic device, the portable electronic

5   device having a display, a motion detector and a memory, the method

comprising:

generating a depiction on the display of the portable electronic device,

the depiction having a first alphanumeric character;

detecting a movement associated with the display of the portable

10   electronic device; and

storing the first alphanumeric character in the memory of the portable

electronic device in response to the detection of the movement.

2.   The method as defined in claim 1, wherein:

15   generating a depiction on the display of the portable electronic device

comprises generating a first depiction of the first alphanumeric character and

a second alphanumeric character on the display, and

detecting a movement associated with the display of the portable

electronic device comprises detecting a first movement associated with the

20   display in a first direction.

3.   The method as defined in claim 2, wherein:

generating a depiction on the display of the portable electronic device

further comprises generating a second depiction on the display, the second

depiction visually identifying the first alphanumeric character in response to

5   the detection of the first movement in the first direction,

detecting a movement associated with the display of the portable

electronic device further comprises detecting a second movement associated

with the display in a second direction, and

storing the first alphanumeric character in the memory of the portable

10   electronic device comprises storing the first alphanumeric character in the

memory in response to the detection of the second movement in the second

direction.

4.   The method as defined in claim 3, wherein:

15   detecting a first movement associated with the display comprises

comparing a magnitude associated with the first movement to a predefined

threshold, and

detecting a second movement associated with the display of the

portable electronic device comprises comparing a magnitude associated with

20   the second movement to a predefined threshold.

5.   The method as defined in claim 1, further comprising displaying the first alphanumeric character in an alphanumeric input area on the display of the portable electronic device in response to the detection of the movement.

6.   The method as defined in claim 1, further comprising dialing the first alphanumeric character in response to the detection of the movement.

7.   The method as defined in claim 1, wherein generating a depiction comprises generating the first alphanumeric character as a character selected from the group of characters consisting of a letter, a number, a Roman numeral, a Chinese character, a Kanji character, a Kana character, and a punctuation character.

8.   A method for selecting a user interface option of selecting a menu item in a user interface of a portable electronic device, the portable electronic device having a display and a motion detector, the method comprising:

generating a depiction on the display of the portable electronic device,

5   the depiction having a first menu item;

detecting a movement associated with the display of the portable electronic device; and

executing a software routine associated with the first menu item in response to the detection of the movement.

10

9.   The method as defined in claim 8, wherein:

generating a depiction on the display of the portable electronic device comprises generating a first depiction of the first menu item and a second menu item on the display, and

15   detecting a movement associated with the display of the portable electronic device comprises detecting a first movement associated with the display in a first direction.

10.   The method as defined in claim 9, wherein:

20   generating a depiction on the display of the portable electronic device further comprises generating a second depiction on the display, the second depiction visually identifying the first menu item in response to the detection of the first movement in the first direction,

detecting a movement associated with the display of the portable

electronic device further comprises detecting a second movement associated

with the display in a second direction, and

executing a software routine associated with the first menu item

5   comprises executing a software routine associated with the first menu item in

response to the detection of the second movement in the second direction.

11.   The method as defined in claim 9, wherein detecting a first movement

associated with the display comprises comparing a magnitude associated

10   with the first movement to a predefined threshold.

12.   The method as defined in claim 8, wherein generating the depiction

comprises generating the first menu item as an icon.

13.   A portable electronic device comprising:

a display;

a motion detector associated with the display, the motion detector

being adapted to generate a motion detection signal in response to

5   movement of the display; and

a controller operatively coupled to the display and the motion detector,

the controller causing the display to generate a user interface depiction, the

user interface depiction being indicative of at least one user input option, the

controller, in response to the motion detection signal, selecting the at least

10   one user input option.

14.   The portable electronic device as defined in claim 13, wherein:

the motion detector is adapted to generate a first motion detection

signal in response to a first motion of the display and a second motion

15   detection signal in response to a second motion of the display, and

the controller is further adapted to cause the display to generate a first

user interface depiction indicative of a plurality of user input options in

response to receiving the first motion detection signal, and to cause the

display to generate a second user interface depiction in response to receiving

20   the second motion detection signal, the second user interface depiction being

indicative of a selected user input option.

15. The portable electronic device as defined in claim 13, wherein the portable electronic device lacks a dedicated keypad.

16. The portable electronic device as defined in claim 13, wherein the controller is further adapted to dial a digit.

17. The portable electronic device as defined in claim 13, wherein the portable electronic device comprises a wireless communication device.

18. The portable electronic device as defined in claim 13, wherein the portable electronic device comprises one of a cellular telephone, a pager, and a personal digital assistant.

19.   A method for selecting a user interface option of invoking a software routine in a user interface of a portable electronic device, the portable electronic device having a display, a motion detector and a memory, the method comprising:

   5   detecting a motion associated with the display;

executing a correlation software routine in response to the detection of the motion of the display;

determining if the motion associated with the display correlates to a predefined motion; and

   10   executing the software routine in response to determining that the motion associated with the display correlates to the predefined motion.

20.   The method as defined in claim 19, wherein executing the software routine comprises executing a display generation routine.

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21.   The method as defined in claim 20 wherein executing the display generation routine comprises generating a windowed display associated with a larger virtual display.

   20   22.   The method of as defined in claim 19 wherein executing the software routine comprises executing an input mode arming/disarming software routine.

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23.   The method as defined in claim 19, further comprising:

storing the motion associated with the display in the memory when the

motion associated with the display does not correlate to a predefined motion;

and

5   clearing previous motions from the memory when the motion

associated with the display correlates to a predefined motion.

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Claims searched: 1-23   **Date of search:** 11 May 2001

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

    UK Cl (Ed.S): H4T (TBLA TBLC TBLX) H4L (LEUG)

    Int Cl (Ed.7):

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0825514 A2 SONY CORPORATION See especially page 5 lines 40-43 and figure 7.	1-3, 8-10, 12-15, 17-21
X	WO 99/22338 A1 BT PLC See especially page 1 line 29 to page 2 line 14.	8-10, 12-15, 17-21
X	WPI Abstract Accession No. 1999-292594 & JP 011095910 CITIZEN WATCH See abstract.	8-10, 12-15, 17-21

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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